MApplication : 10/731,187
Filing Date : 12/09/2003
Inventors : Sivarama K. Kuchibhotla et al.
Title : **ILLUMINATION COMPENSATOR FOR CURVED SURFACE LITHOGRAPHY**

Date : Friday, October 14, 2005

SECTION D – Remarks:

In response to Office Action mailed 4/14/05, please accept the preceding amendments , and these remarks:

Response to Paragraph 1 ***Election / Restrictions***

Applicants and Counsel thank the Examiner for modifying the restriction to permit examination of Claims 10, 11 and 19-24 in addition to Claims 1-9 and 13, provisionally elected as Invention I.

The restriction is otherwise final with respect to the traversed restriction. It would be inappropriate for Counsel to comment further concerning the restriction.

Counsel does, however, wish to state his great respect for the USPTO and for its examiners and clerical staff. Like each examiner, counsel also is an officer of the USPTO through his registration. As such, counsel has a responsibility to present the inventors' best case for grant of a strong patent, and also to speak out when he believes

that the Rules and MPEP are being applied overzealously. Counsel takes seriously his sworn responsibility to respect the USPTO and follow its rules. It is obvious that in this case counsel himself became over-zealous in presenting the case against the six-way restriction,, and for this counsel apologizes.

Counsel thanks the Examiner for the information concerning the continuing availability for personal interview.

Counsel again thanks the Examiner for the professional courtesy in easing the burden of restriction by examining additional claims beyond the minimum under the election.

In summary, Claims 1-13 and 19-24 remain under examination; all other claims (14-18) are withdrawn.

Response to Paragraphs 2 & 3 ***Drawings***

Drawings have been corrected by amendment in a replacement sheet. Acceptance of the corrected drawings is requested. These changes, which are being made pursuant to the Examiner's suggestion to conform existing drawings to existing written description, do not raise any issue of new matter. Designations R_1, R_2, R_3, and R_4 and designations t_1, t_2 and t_3 are now shown in Figure 9. Locking band 9 is now shown in Figure 9. Acceptance of the corrected drawings is requested. A courtesy copy is included for the Chief Draftsperson.

Response to Paragraphs 4 & 5 *Specification*

Response to Paragraph 4. The Abstract is corrected by amendment. Acceptance is requested. The term "zerogon," which was included in the patent application as originally filed in the belief that it would be helpful in understanding the invention, has obviously caused confusion instead. Accordingly, he term "zerogon" has been eliminated wherever appearing, and has been replaced by discussion such as the following:

> "... zero-power optical system, of two identical menisci in close proximity, with their concave surfaces facing each other, the outer surface on which the converging illumination beam is in focus..." or, for brevity "...zero-power meniscus lens pair ..."

There is no new matter in this change to the text. These words are taken directly from the text as originally filed.

Response to Paragraph 5. The patent citation on page 16, line 5 has been corrected to eliminate confusion caused by the low patent number and the date. Instead of "U.S. Patent 706,650-1902," the text has been amended and now reads :

"U.S. Patent 706,650, granted August 12, 1902."

This is a proper patent number. A copy of the Goerz U. S. patent 706,650 is enclosed.

Response to Paragraphs 6 & 7 -- *Section 112—Required Definiteness of Claims*

The Examiner's quotation from Section 112 is appropriate and exact. Note that the actual words quoted are:

"... claims particularly pointing out and distinctly claiming the subject matter..." The usual shorthand term used in an Office Action, the term "indefinite," is itself inexact as contrasted to "particularly pointing out" and "distinctly claiming."

Claims 10-11, 13 and 19 stand rejected in a concern that they might be indefinite; that is, a concern that they might fail in compliance with: "...particularly pointing out and distinctly claiming the subject matter....." Counsel has made a strenuous effort to comply.

Response to Paragraph 7, Sub-Paragraph A. The Examiner found Counsel's use of the coined term "zerogon" to be a source of confusion. Counsel apologizes for this attempt to use the newly-coined term "zerogon,." This term was believed new to this invention, and believed meaningful as defined and a great savings of verbiage. The term "zerogon" apparently has been previously used, by others, in some differing meaning. Accordingly, the term "zerogon" has been removed from the

specification and claims, wherever found, and has been replaced with appropriate text, usually shortened to:

"zero-power meniscus lens pair"

Response to Paragraph 7, Sub-Paragraph B.

Claim Rejections –Section 112 Claim 19 stands rejected as a "hybrid" because it was confusing as to whether its intent was to be an apparatus claim with activity and method limitations, or a method claim. The Examiner pointed out the area of confusion, and made suggestions. These suggestions are being implemented, with thanks.

Reconsideration of Claim 19 is requested. This rejection is a Section 112 rejection, which requires pointing out and distinctly claiming the invention. This rejection of Claim 19 has been resolved by elimination of the term "zerogon" in favor of the more descriptive words "...a zero-power pair of identical oppositely-oriented meniscus lens elements." The confusion here is caused by the extremely broad definition required by practice, and pointed out by the Examiner, to apply to the term "zerogon." There is no confusion as to the teaching of Dr. Klosner in his patent '908 or the teaching of this patent application by Dr. Kuchibhotla, Dr. Jain & Dr. Klosner. Counsel never intended such breadth of meaning in this patent application. The intention of Claim 19, which is admittedly broad, was to cover the situation where the second one of the paired meniscus lenses does double duty – it not only carries out its optical

function but also carries out the mechanical function of supporting the curved mask. The curved mask matches the curvature of its supporting meniscus lens.

Counsel has rewritten Claim 19 as a more standardized apparatus claim, using the "means plus function" format suggested by the Examiner, as follows:

19. A projection lithography scanning system for imaging a curved mask onto a curved substrate, with provisions for control of defocus, which must be minimized for scanning systems, comprising:

a) means for [by] continuously adjusting the position of the projection lens along its axis, during scanning, with [the] adjustments related to changes of topography of the curved mask and substrate, such that the object distance and image distance for the conjugate points at the center of the lens field remain constant during scanning, [together with] and

b) means to keep the size of the scanning polygon constant on the curved mask and curved substrate.

Claim 19 has been corrected to eliminate any hybrid nature. It now is a standard claim to apparatus, a standard "means plus function" claim. It covers the system configuration of the adjustable positioning of the projection lens to maintain object distance and image distance constant during scanning of a curved surface.

Response to Paragraphs 8 & 9 ***Claim Rejection – Section 102***

Anticipation by One-Year Patenting, Printed Publication or Public Use

The Examiner quotes Section 102 appropriately in Paragraph 8. This is the one-year public knowledge bar to patentability, and ordinarily requires no explanation or comment. Nevertheless, it is good to review the powerful strictness of Section 102 in matters of anticipation. A Section 102 rejection requires ***anticipation***—an earlier public disclosure of exactly the same invention. The cited prior art item must actually teach the complete invention as claimed, with the same elements and relationships, or anticipation fails. Experimentation is not permitted. Combining or selecting elements and relationships from plural or multiple references, either known to the person of ordinary skill in the art, or within his imputed knowledge, still without experimentation, does not authorize a Section 102 denial of the claim. Such combining , while it might be a matter for Section 103 Obviousness, is certainly not Anticipation under Section 102.

Obviousness differs greatly from Anticipation. Obviousness, while more likely to occur in life, is enormously difficult to prove in matters of patent, This is particularly the case when the primary reference in obviousness is the previous work of the same group of inventors. Counsel notes that the Dr. Klosner of Klosner et al. '908 is the same person as the Dr. Klosner who is a co-inventor of this patent application, and the Dr. Jain of Klosner et al. '908 is the same person as the Dr. Jain of this patent application. Both

Klosner et al. '908 and this patent application are assigned to the Anvik Corporation, a top player in the field. If the invention had been obvious, why did the inventors miss it?

In summary, Section 102 Anticipation requires that a single reference must demolish novelty to negate patentability. There is no such anticipating reference here; certainly the previous efforts of the same group of inventors are different.

Reconsideration is requested for Claims 10-11, which were rejected in Paragraph 9 under Section 102 as anticipated by US Patent 6,416,908 (Klosner et al. '908), Counsel and two of the three inventors of the current patent application worked on the previous invention cited here (Klosner et al. '908). Klosner et al. '908 was cited in text and drawings (See Figure 2 of this patent application) and differs primarily in operational mode, but in major hardware differs only by the zero-power meniscus lens pair ("... zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ...") shown schematically as lens 1 in Figure 1, and with more detail in Figure 9, of this patent application. Both Klosner et al. '908 and this patent application provide for imaging a pattern from a curved mask onto a curved substrate. The earlier patent of Drs. Jain and Klosner, plus two other inventors, is "... to achieve a constant track length for conjugate object and image points." The Klosner et al. '908 patent in its preferred embodiment uses a 1:1 projection lens, and has the curved mask and the curved substrate oppositely curved, so that the track length is kept roughly constant by geometry of the radii of curvature. Magnification errors, which could exceed the depth-

of-focus of the imaging lens, "... are controlled by continuous adjustments of the z-position of the projection lens during scanning..." (See Klosner et al. '908, Abstract, *passim*) Note that Klosner et al. '908 is not limited to 1 : 1 projection. (See Klosner et al. '908, Column 8 & 26-32.)

Counsel asks the Examiner to reconsider the rejection of Claims 10 and 11 of this patent application as anticipated (Section 102) by Klosner et al. '908. Even with a vastly expanded understanding of the term "zerogon." this appears to be a mistake. Claims 10 and 11 are limited to the situation where the zerogon, now described quite fully as:

> **"...** zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ..."
>
> " directly serves as "... mask support for a flexible film

curved mask." Klosner et al. '908 has nothing equivalent to the **"...** zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ..." , however the previously-used term " zerogon" might have been defined. Klosner et al. '908 shows a curved mask, and in Figure 5 shows how a curved mask may be derived from patterned flexible films conformed onto a curved transparent quartz blank. There is no hint, however, that the quartz blank has any positive or negative or balanced optical characteristics which might make it a "zerogon," unless the definition of "zerogon" is stretched to "anything at all" or "Item 15 of Figure 2 of Klosner et al. '908, the scanning platform of the stage." Counsel repeats his apologies for confusion wrought by the use

prior to this amendment of the coined term "zerogon." The amendments to Claims 10 and 11 make it clear what is meant by Claims 10 and 11, and should eliminate any concern of anticipation. Allowance of Claims 10 and 11, as amended, is requested.

The three inventors in this patent application maintain coupling between mask and substrate by linearly moving the 1:1 projection lens for compensation. Claims 10-11, 13 and 19, as amended to substitute ordinary scientific terms for the term "zerogon," clearly state this linear movement capability in the appropriate "means plus function" format. This type of motion was described in Klosner et al. '908 and is not in itself depended upon for inventive novelty. It is, however, important to the invention in this patent application, inventive, now clearly claimed in Claims 13 and 19 as merely one of several elements and relationships, as follows:

> "... zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ..."

Allowance is requested.

Klosner et al. '908 shows (only positionally) a support for the curved mask and a support for the curved substrate, but gives no detail. Klosner et al. '908 does in fact show complementary curvatures of mask and substrate, and one might infer that the supports for mask and substrate might be curved similarly to that which they are designed

to support, but such similar curvature is not specified and might cause disastrously unplanned diffraction. Given the wide breadth of meaning which the Examiner has ascribed to the previously-used term "zerogon," and thus giving the claims virtually infinite breadth, Claims 10-11, 13 and 19 might well have been appropriate candidates for a Section 102 rejection as if such similar curvatures had been specified. As amended, however, these claims distinguish from Klosner et al. '908 by limitations to the movable projection lens and other elements and relationships as shown in the following claims with individual comments:

Concern of Anticipation of Claim 10

A projection lithography system having a zero-power twin-meniscus compensator as mask support for a flexible film curved mask.

Comment: Certainly Klosner et al. '908 had no zero-power twin-meniscus compensator at all, much less such a zero-power twin-meniscus compensator as mask support for a flexible film curved mask.

Concern of Anticipation of Claim 11

A projection lithography system having a zero-power twin-meniscus compensator as mask support for a flexible film curved mask, and having a locking band to hold said flexible film mask in place on such zero-power twin-meniscus compensator..

Comment: Certainly Klosner et al. '908 had no zero-power twin-meniscus compensator at all, much less such a zero-power twin-meniscus compensator as mask support for a flexible film curved mask, and absolutely no hint of any locking band.

Response to Paragraph 10 - -Concern for Section 102(b) Anticipation by Murayama et al. '552

Claim 24 stands rejected under Section 102(b) in light of Murayama et al US Patent 5,757,552. Reconsideration is requested.

Note that the Examiner has again invoked the very broad "anything at all" meaning of the previously-used term "zerogon." An earlier meaning was given as a stage platform; now the meaning is given as a corrective lens group. Counsel again repeats his apologies for using the coined term "zerogon," but must point out that the confusion was a Section 112 matter, not appropriately handled by Section 102 under the "anything at all" definition by which all things must be considered anticipated.

Murayama '552 shows the following:

A front lens group, a corrective lens group, and a rear lens group together forming a microscope objective lens. The front lens group has positive refractive power and the rear lens group has negative refractive power.

The Examiner is asked to withdraw the Murayama et al. '552 for the simple reason that it does not show the elements claimed in Claim 24 as follows:

"...A zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ..."

Murayama et al. '552 corrective group C (M1 and M2) does not have identical lens elements, as appears at a glance in the illustrative figure, which is Figure 1. Lens element 12 in M2 s much thicker than lens element 9 in M1.

In Murayama et al. '552, the corrective lens group C is axially movable, and consists of two meniscus lenses (M1 & M2) with the concave sides facing each other. The corrective lens group C makes entering light appear taller as it is moved frontwardly; the corrective lens group makes entering light appear shorter as it is moved rearwardly. The corrective lens group thus can correct spherical aberrations by being moved axially. The purpose of the corrective group is to correct for aberrations arising from the cover glass. Positive magnification is suggested for the corrective lens group.

Murayama et al. '552 teaches how to make a microscope objective lens. There is no recommendation of using the pair of meniscus lenses as a zero power lens group in a projection lithographic system. This differs from the claimed elements and relationships of this patent application, as claimed in Claim 24. Murayama et al. '552 does not show the elements as follows:

"...A zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ..."

Murayama '552 does not specify zero power. Murayama, et al., at Column 4, lines 30-36, suggests "... 2% or less of the overall refractive power ... of the objective lens ... relatively no refractive power..." Since Murayama et al. '552 does not specify a pair of identical oppositely-oriented meniscus lens elements in close proximity, and does not specify zero power, the Examiner is asked to withdraw this ground of rejection.

Murayama '552 does not use the exit meniscus lens element surface as a mask support, as will become important in reviewing Claim 23.

Claim 24, as amended, is as follows:

Claim 24 (Amended) A zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity, to act as a null compensator to transmit collimated and uncollimated beams of light without deviation and without shift from the line of propagation.

Comment: Murayama et al. '552 does not show a zero-power identical pair. Murayama et al. '552 shows a duo of oppositely-oriented meniscus lens elements in his corrective group, Group C. The function of Group C, as stated in the Abstract, is to correct aberrations arising from a cover glass. At Column 4, lines 30-32, Murayama specifies that "... The refractive power ... of the corrective lens group is ["...preferably

about 2% or less of the refractive power of the objective lens..." Elsewhere (Col 7, line 23-26) it is stated that the magnification of the corrective lens group C ... is about 1.000."

Allowance of Claim 24, as amended, is requested.

General Discussion of Section 102 Anticipation

It is appropriate to deny a patent claim on the basis of anticipation if it claims the same invention which was earlier made available to the public by publication either in a patent or in print. The theory of anticipation is a failure of consideration for a contract – the inventor's providing details of a new invention in consideration of the public's award of exclusivity for the period now of twenty years.

Anticipation, if it occurs, should cause the Examiner to deny patentability regardless of claim wording. Anticipation should not be invoked against only a subset of claims because it is not curable by a change of words. If the invention is improperly claimed, the anticipated claim fails for lack of distinctness, and the Examiner properly requires a change of wording by invoking Section 112. Section 102 Anticipation is a single-bullet death of novelty; failure of novelty would make distinctness of a claim totally irrelevant. In this patent application, the Examiner has previously properly invoked Section 112 because of confusion caused by the term "zerogon.". Counsel has

apologized for the over-enthusiastic use of the coined term "zerogon," which was believed to be both absolutely new and properly defined in the specification. Wrong on both counts, counsel has simply removed the term in favor of its definition each time it appears, or equivalent standard terms in context.

Accordingly, counsel has treated the Section 102 rejections of Claims 23 and 24 as if they were Section 112 rejections, but has also discussed prior art to show that amendments have cured any failure of distinctness. Counsel has discussed the absence of failure of anticipation and absence of failure of obviousness.

There is another matter, choice of classification. The USPTO has assigned this patent application to class 355 and ha assigned Murayama et al '552 to class 359. While projection lithography systems (class 355) and microscopes (class 359) have a great deal in common, they differ significantly in details of construction. A microscope typically passes radiation of low fluence, usually visible light, while a projection lithography system typically passes radiation of high fluence, often visible light but often ultra-violet radiation. Different refractive materials, different anti-reflection coatings, and vastly different attitudes toward magnification, make specialization quite common. The person operating the microscope has skills quite different from the person operating the microlithography system. While these comments do not argue that the master designer could not move from microscope to microlithography, it would be very unusual to expect a person of ordinary skill in microscopy to recognize a problem in microlithography,

much less to cannibalize his microscope in the expectation of solving such a problem in microlithography.

In summary, Klosner et al. '908, which addresses essentially the same problem in projection lithography on curved surfaces, might be expected to provide a Section 102 solution (but does not). Klosner et al. '908 does not provide any equivalent to the "... zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ...") Contrarily, Murayama et al. '552 does not address any similar problem. It is not related to projection lithography or to curved surfaces. It does not provide any equivalent to the "... zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ..."). Even if it should have addressed a similar problem related to curved surfaces (it did not) and even if it should have provided such a solution as "... zero-power pair of identical oppositely-oriented meniscus lens elements in close proximity ...") it would have been so deeply imbedded in its own problem (cover glass aberrations) and so deeply embedded in its own 15-element 3-group compound microscope objective lens system that the person of ordinary skill in the art would not know how to define either the problem or the solution. Section 102 anticipation needs the publication of the entire invention to deny novelty of the same entire invention – this is not the situation here. Klosner et al. '908 did not address the problem and did not include the solution claimed in this later patent application by four inventors, including two of the inventors of the cited patent, working in the same technology. Murayama et

al. '552 did not address the problem and did not include the solution claimed in this current patent application. Both the cited patents had an axially-movable lens to accomplish corrections of different problems. Neither of the cited patents identified or solved the exact problem identified and solved by this patent application.

Withdrawal of both Section 102 citations is requested, with allowance of the related claims (Claims 10, 11, 23 and 24) contingent on withdrawal of other concerns which might relate to Claims 23 and 24.

Response to Paragraph 11 -- *Claim Rejections -- Section 103 -- Obviousness*

Paragraph 11 states the "Obviousness" ground of rejection and requires summarization and comment. The essence of this ground is "...whether the subject matter as a whole would have been obvious to a person having ordinary skill in the art."

Counsel has already provided some discussion of the reasons why Section 102 differs from Sections 112 & 103, why anticipation differs from distinctness of claiming and from obviousness.

Section 103 Obviousness goes back to the ancient hierarchy of Master, Journeyman and Apprentice. The Master, of course, is the most capable. Certainly experienced scientists with doctorate degrees (such as Dr. Jain, Dr. Klosner and Dr. Kuchibhotla) who work in a laboratory creating new lithographic systems, fall into the category of "Master." Such persons are expected to define and to resolve difficult new problems – and possibly to invent.

The Apprentice, of course, is the least capable, at least in the early youth of skill and experience development. The Apprentice is expected to learn while working under the supervision of a more experienced person – but the apprentice is not expected to invent.

The journeyman skill level is most difficult to define, and of course is typically the largest of the three groups in the skill hierarchy, by population. The Journeyman is expected to journey to the job site, and at the job site to define and solve problems by

applying his or her skill and experience. The journeyman is expected to do the job properly, without on-site supervision, but not to invent.

Stated differently, if the journeyman would be expected to solve the ordinary problem, using ordinary skill, knowledge and experience, or to solve the ordinary problem the way other journeymen would have solved it, then the solution is not "invention." Such a solution would be in the journeyman's tool kit or procedures manual.

Obviousness is a difficult concept to apply in patent law. Obviousness in patent law is always viewed from a distance, usually prospective in time. The viewer always has the perspective of some real or conjectural basis of fact, retroactive in time. Judgment of the condition of past "obviousness" invariably exists in the negative question form – "Why ***wasn't*** that obvious?"

If obvious, why wasn't it ***accomplished***?

The condition of past obviousness is not generally subject to objective proof in patent law, because there would be no need for proof of past obviousness. If it had actually been obvious in the past. Any current patentability issue would be easily and objectively resolved on the basis of anticipation.

Obviousness in patent law is also complex in that it must involve a set of two or more baseline "facts," both being obviousness factors for examination purposes, either an actual historic fact or conjectural legally presumed "factoid." The Examiner would

not need to determine obviousness if the proposed invention were anticipated by a single reference. The Examiner's concern appears only if there are at least two obviousness factors present, plus a recommendation to combine such obviousness factors.

The concept of obviousness in patent law has some special rules and some special practices. Obviousness is typically discussed in terms of a single claim or group of dependent claims. Obviousness in patent law is never simple. If the issue were ***novelty*** and the situation involved only one item of prior art, then the issue is the relatively objective determination of fact, resolved by invoking the Section 102 bar of Anticipation as mentioned above. If the prior art reference should actually anticipate, that is, disclose the same invention to the public, then there is no novelty and the claim fails for anticipation under Section 102.

Obviousness, therefore, is always a fact-and-factoid-based determination in which a sort of virtual anticipation is determined, or negated. The virtual anticipation is determined subjectively by the Examiner (or other judge on appeal) with respect to the invention. The patent claim fails for Obviousness if the necessary novelty factor and inventive level factor are both found by the Examiner to be lacking. Such factor lacks are determined subjectively by the Examiner, always by combining a set of at least two fact/factoid obviousness precursors, usually prior art patents or other prior art publications, forming a fact-plus-factoid structure which demolishes the required novelty and the level of invention for patentability of the claim.

Even so, patentability still remains in absence of recommendation to combine. Even if the combination of cited references, usually a principal reference fact and a secondary reference factoid, discloses the invention of concern as claimed, there is still another requirement – ***recommendation to combine.*** The cited references together may disclose a complete catalog of parts of the invention, at least as legally-presumed factoids, easily assembled within the ordinary skill in the art, but this scenario may still fail for absence of recommendation to combine.

The recommendation to combine must be quite specific. The journeyman must be ***expected*** to combine. This assumes a persuasively-presented recommendation amounting to an assembly diagram, somehow creating in the journeyman's mind an assurance of success similar to a compulsion to combine. The obviousness still fails unless the person of ordinary skill is chargeable with such compulsion. There must be a sort of obsession, or a directive from authority, compelling the journeyman to have confidence in making the proper combination. A sort of self-directing vision will not suffice – if the combination is not in the journeyman's experience, or in his tool kit or instruction manual, the journeyman is not expected to experiment, nor to rely on intuition, some sort of self-directing vision, to select the proper combination. There are myriad possible combinations, and few of such combinations will succeed at all, much less on a confident first attempt. Few of such combinations will work; fewer will both inspire confidence

and also work. Even fewer still will inspire such confidence without the actual recommendation to combine.

It must be remembered that the Obviousness concern contemplated by Section 103 ***never*** arises in actuality—the obviousness concern in patent applications only arises in the situation where evidence is completely lacking that the actual combination has ever actually been made. The obviousness situation in patent law is one in which the situation is so compelling that the law presumes (non-rebuttable presumption) that a person skilled in the art would have been expected (actually compelled, because experimentation is not permitted) to reach the identical solution with confidence. Such compulsion, in a presumed similar circumstance, would require each of the population of journeymen (or at least a random choice among several of them) to solve the admittedly new problem the same way, by combining as in the disputed claim the two or more facts and factoids according to the compelling recommendation. To deny patentability, the person of ordinary skill, sometimes called "artisan" but in this discussion called "journeyman," is expected, under compulsion of his ordinary skill, to combine the references as in the disputed claim.

Section 103 does not lightly deny patentability. The key words are "...differences ... as a whole would have been obvious ..." The person of ordinary skill is not expected to create his own technique of combining references, nor is he expected to experiment or create – absent a recommendation to combine. To deny patentability because of such

"... expectation absent recommendation ..." would set the denial of invention very near "zero level" in situations where a good hardware store stocks the materials to build the invention. Even in the situation of absolute novelty existing in the combination as recited in the disputed claim, some finite amount of experimentation could disclose the near-zero inventive level of the disputed claim over the non-suggested multi-reference combination.

The journeyman's compulsion is very mild. Such compulsion works only if such a combination technique is so well-known in the art that a journeyman should know the technique. He should recall that he had seen the technique before, or even practiced the technique before, in a similar circumstance. If following such a technique is not so well-known that the journeyman is ***expected*** to follow the technique, and to do so with confidence, he is expected not to bother with it. Even so, he may follow a recommendation made in one of the cited references on combining the references in the manner which is sufficiently similar to the technique claimed by the patent applicant to support the Examiner's denial of the claim. In patent law, the combination of two or more technical items into the claimed solution, if there is a recommendation to combine, is a sort of virtual anticipation, a negation of novelty by conjecture, even though there is no actual anticipation.

Because Section 103 Obviousness is knowingly based upon legal presumption contrary to actuality, one must ask "Why? Is it fair to deny a patent simply because a

mythical journeyman might have had the invention in his equally-mythical toolbox?"

No. This would be too great a departure from reality. But we don't want people patenting combinations having miniscule level of invention. Hence the requirement of actual recommendation to combine, to create as a bar to patentability an expectation of self-recommendation by the journeyman, based on ordinary skill.

This soup of course boils down finally to a decision by the Examiner, whether the two or more prior art items inexorably stick together by the actual recommendation to stick them together, or can the Examiner boil the soup just a little longer to make it more sticky by a decision that the journeyman should have self-suggested the claimed solution? This is a tough job to put onto the Examiner. The Examiner must decide whether to allow or deny a patent claim on his own judgment with only presumptions of fact contrary to actual fact. The presumed facts are these:

Scenario 1 There is no evidence that any actual journeyman was aware of two or more fact or factoid items of prior art, but the mythical journeyman is presumed to know such factoid items because he should have read about such factoid items in a mythical manual, and therefore he is charged with knowledge he did not actually have. (***Presumed*** fact items can negate patentability if properly combined. The issue switches to whether the journeyman is charged with a recommendation to combine, but the recommendation to combine is ***not presumed***. The recommendation to combine must be ***actual***. ***The claim survives.)***

Scenario 2. Assume that the journeyman is charged with fact and factoid. If an actual journeyman's manual or equivalent source of recommendation had also suggested that the fact and factoid be combined, the Examiner is obliged to deny the patent claim. (Fact plus factoid plus recommendation to combine-- ***Patentability fails.)***

Restated, Section 103 Obviousness is a reason for denying a patent claim by a legally-presumed negation of novelty requires an actual negation of inventive level of the claimed invention by a finding of recommendation to combine.

The Examiner's determination must be subjective, based upon the Examiner's attribution of skill level to the mythical journeyman, the "person of ordinary skill in the art." The Examiner's selection of two or more prior art references, typically publication, must provide the techniques and the motivation – the substitute elements and the recommendation to combine them. (With any lack of techniques and motivation, obviousness fails and patentability prevails.)

Even the seemingly innocuous term " ... in the art ..." must be considered by the Examiner. There are many different arts. A journeyman bricklayer, for example, would not be expected to know how to wire a circuit breaker panel, a skill to be expected of a journeyman electrician, but might be expected to know how to run a wire to a lamp embedded in a brick wall. Accordingly, the two or more citations of prior art must be in the same art as the invention of the disputed claim. This appears simple, but patent office practice has not been rigorous in determining where one art stops and another art begins.

Certainly, an "art" is not circumscribed by USPTO classification, with its too-few classes and its far-too-many subclasses. If the Examiner should make a bad judgment call, to include a prior art item "in the art" improperly, this could cause denial of a proper patent claim. If the Examiner should make a bad judgment call on a recommendation matter, this could deny a patent claim. OF course, if the Examiner makes bad judgment calls the opposite way, negating a fully appropriate bar to patentability by mistakenly excluding it from the selected art , the public will be burdened with an unwisely granted patent claim.

In most situations in patent examination, the Examiner makes judgments based on technology, usually on the basis of facts which the Examiner applies without interpretation, strictly within the bounds of science. Matters of anticipation are not easy, but the judgment call is based on technological identity of features.

The situation, in the matter of obviousness, is more arcane. Technological identity of features is not present as a fact, or the disputed claim would have been denied under Section 102.

The Section 103 question of patentability is most often resolved by reviewing the recommendation to combine features. Combining technology, even combining subassemblies, is difficult, without unequivocal evidence of the recommendation to combine. The usual strong evidence is an actual recommendation, in print , to make the

combination. The Examiner must find and evaluate such a recommendation to support any denial of the claim under Section 103.

Obviousness decisions require a set of mythical personnel, journeymen who have ordinary skill in the art, but there is typically no human resources department or union or government-sponsored qualifying agency to list the journeymen.. There is no detailed job description, "...having ordinary skill in the art..." There is no career path from beginner to boss; not even the fanciful career path as in real life, except possibly the ancient guild path from apprentice to journeyman to master. There is some attempt toward licensing of skilled trades journeymen, but seldom any legally-defined apprenticeship, and almost never any or test of qualification as a "master" other than an advanced college degree, except in recognized professions such as medicine, architecture and law or licensed skills such as public accounting and engineering.

In matters of high-resolution imaging equipment, there is no known college degree such as "bachelor of science in projection imaging." Even the college Master's Degree level may not defined a person as a traditional master, much less define a person as " expected to invent." "PhD in Physic" might be appropriate, as perhaps is "PhD in Electronics" or "PhD in Optical Science," which might tend to define the modern equivalent to the ancient "Master" in time of Galileo.

Back to the arcane matters of obviousness. The Examiner's selection of prior art references typically includes two references, occasionally three or more references.

Typically, one of these references, the "primary reference," defines the problem and may suggest a solution other than the solution of the disputed claim . A secondary reference must provide the claimed solution, or provide an alternative module or subassembly to alter the mode of operation of the principal reference, to equip it for such a different solution as called for by the disputed claim. Where the Examiner properly melds primary reference and secondary reference according to a recommendation to combine them, the claim typically fails.

Occasionally the Examiner may meld more than two references, but seldom more than three references. The primary reference typically defines the problem and gives a solution. This concept is usually resolved by finding the problem a simple problem, and providing as the solution a meld of two parts. To make a patent application purported invention "obvious, " the primary reference must provide a structure to solve the problem to be solved by the purported invention of the patent application claim, and also there must be a reasonable secondary reference to complete the invention by obviousness. Even this is not enough. The principal reference or another reference must actually suggest the secondary element as a completion. As an example, the wheel might be a primary reference, and a spoke a secondary reference. The wheel and spoke do not suggest adjustability of a spoke as is common in bicycle wheels; full knowledge of the wheel and of the spoke would not make it obvious to provide an adjustable wire spoke to the wheel.

Not only a complete set of element references, but recommendation to combine such elements is required to deny patentability.

Response to Paragraph 12. Section 103(a) Klosner et al. & Murayama et al.

The Examiner is asked to withdraw the Section 103 rejections of Claims 13 and 19. Klosner et al. '908 in view of Murayama '552 would fail as obviousness simply because there is no recommendation to combine elements. Further, there is a failure of obviousness because, even if combined, Klosner et al. '908 and Murayama '552 would be a significantly different apparatus, possibly useful, but not capable of performing as in this patent application to ...maintain "a constant optical path length for conjugate image points to maintain the substrate surface within depth of focus, thereby providing a depth of focus much larger than the depth of focus of the projection optics itself." Dr. Klosner, in his earlier patent (Klosner et al. '908) included no such feature as an extension of depth of focus, but rather a standard depth of focus with a complementary arrangement of curvatures. Such complementary arrangement of curvatures did not require such an extension of depth of focus. There is of course no recommendation in Klosner et al. '908 or in Murayama et al. '552 to combine them.

Dr. Klosner's did not include in his earlier patent (Klosner et al. '908) any such recommendation as continuously adjusting the position of the projection lens along its axis during the scanning operation. Even if Klosner et al. '908 and Murayama et al. '552

were to be combined, such a combination would differ dramatically from the combination claimed in this current patent application. This difference is in the controlled linear movement of the projection lens, which has the result of keeping the balance between object side of the beam path and the image side of the beam path, consequently maintaining depth of focus by providing a larger effective depth of focus.

Allowance of Claims 13 and 19 is requested.

Response to Paragraph 13 Section 103(a) Claim 1 Klosner et al. & Marusann et al. & Moskovich

Reconsideration of Claim 1 is requested. The Examiner is asked to withdraw the three-reference Section 103 rejection of Claim 1. Counsel does not argue that three-reference obviousness is impossible, or even improper under the USPTO rules, but points out that the logical odds of successfully combining multiple references diminish significantly as a function of the number of references to be combined and the different modes of operation of those references. Counsel also points out that finding a recommendation to combine elements from three references is unlikely.

First of all, this type of imaging system is extremely expensive, and the subassemblies, even modular subassemblies, are designed, built and tuned to work together in the system for which they are designed. There are usually no available spare

subassemblies or available off-the-shelf alternative subassemblies. Typically, there are differing modes of operation which would make it difficult to substitute subassemblies. There may not even be spare parts for easy substitution. It is not possible to cannibalize a junked microscope system for use in a microelectronics imaging system, because the junked system subassemblies are not designed tot fit physically or to perform appropriately in such differing modes of operation.

Second, there typically is a high-fluence ultraviolet laser providing the imaging radiation, which radiation can destroy other subassemblies not designed and tuned to the appropriate frequency and fluence. Any person of ordinary skill making a substitution with mode of operation change would be treated with the same derision as an automobile-racing pit crew mechanic installing a bicycle tire on a formula one race car during a race, or a jet plane mechanic trying to fit a propeller onto a jet engine.

The mythical "person of ordinary skill," after all, is a journeyman, not the systems designer with the doctorate and postdoctoral degrees and decade or decades of experience of the three inventors here. The person of ordinary skill in this sort of high-resolution optical imaging system is normally expected simply to operate the system, never to alter the mode of operation. The person of ordinary skill may perhaps adjust the system parameters to accommodate a change of product, but only according to supplied specifications. The person of ordinary skill may occasionally be called upon to recalibrate the system according to a manufacturer's manual, or to flush and replace the

gases in the laser, but would not substitute a microscope objective lens subsystem for an ultraviolet laser lens system.

In the situation here, the journeyman making such changes would be jeopardizing his own safety and that of his co-workers, and would be possibly destroying a valuable and critical production system. He would almost certainly lose his job. He might even bankrupt the owner of the system, if production were stopped for a significant period of time or if the change caused faulty production requiring a recall repair, or, more likely for this sort of system, a diversion of a major production run to the scrap dumpster.

In summary, the person skilled in the art would be expected ***not*** to make the three-reference substitutions contemplated in this Section 103 rejection.

It is appropriate to explore a scenario of what would have happened:

Klosner et al. '908 and Murayama et al. '552 are improperly assumed by the Examiner to disclose all basic features – but, even assuming the existence of necessary subassemblies, remember that the person skilled in the art does not start out with a properly operational Klosner / Murayama Section 103 combination system. At best, the person skilled in the art might have a recently-operational system to repair or alter, and one or two (inoperative) junk systems to cannibalize. Once he opens up the covers of the recently-operational system, he also has a newly non-operational Klosner et al. '908 system. Assuming he has a non-operational Murayama et al. '552 system, he can tear it apart for use of parts and subassemblies. He now has two non-operational systems, a

non-operational microelectronics imaging system and a non-operational microscope system.

Somehow, according to the Section 103 supposition only (without any recommendation from anyone as to how to proceed in combining system parts) the person skilled in the art starts with the Klosner et al. '908 system as his base, and removes the projection optics. He then substitutes the Murayama '552 projection optics. He still has no recommendation whether or how to change mode of operation to make the replacement optics, the microscope objective lens elements, function. He has no theory of whether and how to install the replacement microscope objective optics as replacements for the projection optics, and no theory of whether and how to provide linear motion to the replacement projection optics. He has replacement projection optics which can no longer function in the non-suggested but newly-required mode demanded by the lens substitution. The Murayama '552 device has provided a microscope objective lens subassembly not suited to high-resolution, high-fluence projection imaging. The Murayama '552 system has a corrective lens group (Group C, Figure 1) which is movable, but this corrective lens group does not have the complementarily positioned twin meniscus lens pair oriented concave-to-concave but rather has its twin-meniscus-pair oriented convex-to-convex. (See Murayama et al. Abstract.). The reason given by Murayama et al. for this corrective lens group is to "...correct aberrations arising from a cover glass..." The person skilled in the art has now sacrificed operational capability as

a microelectronics imaging device in a misguided attempt to solve a problem (cover-glass aberrations) which he previously did not even have.

Cannibalizing the Moskovitch lens intact would not help, even though the Moskovitch '861 lens has a stated use in projection. Such projection is in big-screen television, greatly differing from high-resolution projection scanning for microelectronics. Moskovitch states that the lens is useful as a wide-angle lens or as a telecentric lens, emphasizing that the lens has "...a large field of view." Moskovitch, in describing the corrective meniscus lens group (Group G1) puts together two meniscus lenses with their concave sides facing, and states that the"... combined optical power of the two meniscus elements is negative..." (Column 3, lines 16-21)

The person skilled in the art obviously has no concern for costs, since he has destroyed three optical subsystems (the Klosner et al. '908 optical subsystem; the Murayama '552 lens system; and the Moskovitch '861 lens system) and built something that won't do any job properly -- even if he knew what the job was to be – because the projection lens system selection was the objective lens system from a microscope. Why would this person skilled in the art seek out the Moskovitch lens group to reduce the cost? This person of ordinary skill has now destroyed a third system to cannibalize and tear down its lens to obtain the complementary twin meniscus lens elements and substitute them in the center of the Murayama et al. '552 lens group! Incidentally, it is a job of complexity and skill to tear down a multi-element lens to gain access to internal

elements, and it is a job of complexity and skill to develop a lens barrel of appropriate dimensions and finish to accept the cannibalized Moskovitch '861 meniscus lenses, and it is a job of complexity and skill to assemble all the elements of such a multi-element lens into an operative lens subsystem. This assumes the miracle of lens elements doing a job other than the job for which they were designed. We should hope that the person of ordinary skill will remember to protect the anti-reflection coatings on the lens elements, and to have such coatings removed and replaced by other coatings wherever they were damaged or designed for a different frequency of radiation than the frequency to be used. We should hope that the person skilled in the art will use special care in applying high-fluence ultra-violet radiation to lens elements designed for optical frequencies of low fluence.

This would not be a job expected of a person of ordinary skill. System design in this sort of system is not done by a journeyman – it requires the education and talent and years of experience of the Master. It also requires a laboratory with capability to build and test a prototype lens system. as a subassembly in the overall system. Lens design likewise is not the job of the journeyman. Even if a person could be found having ordinary skill as a system operator or repairman, and also having ordinary skill as a lens assembler, such person would require several different Journeyman skills of tear-down and of lens barrel machining to make his effort successful, not to mention the extraordinary skills of lens design and systems design required. Even when all this

conjecture is completed, such a remarkable person of ordinary skill is still stymied, because his collection of ordinary skills does not include the critical knowledge of whether and how to provide controlled linear movement of the projection lens to accomplish the necessary balance of conjugates. The critical recommendation is lacking.

The Examiner is asked to reconsider and withdraw this ground of rejection as outside ordinary skill to do (and inoperative if done) without the added invention of controlled motion of the projection lens.

The substitutions of the lens systems of Murayama et al. '552 and of Moskovitch '861 would be inappropriate for the mode of operation contemplated in this patent application. The proposed claims in this patent application require claim elements which differ from somewhat similar elements in the cited prior art.

Response to Paragraph 14 Section 103(a) Klosner et al. & Murayama et al. & Moskovich & Konoma et al.

Counsel asks the Examiner to reconsider and withdraw the rejection of Claims 2,4-5 and 20-21 under Section 103. A four-citation obviousness rejection defies logic in this art of high-resolution high-fluence optics. The person of ordinary skill in the art, the Journeyman in the hierarchy Apprentice/Journeyman/Master of the time of the creation

of the US patent system, might be a system operator or even a field engineer. The person of ordinary skill would not be a systems creator with a doctorate or post-doctorate degree and one or more decades of high-level experience in systems design. Three such Masters, working together directly to create state-of-the-art-extending systems in this exact field, knowledgeable of the prior art and of the science and distribution of technology, did not cobble this invention up out of a known problem and a number of alternative solutions. The problem itself was not defined; alternative solutions did not exist; and there was no recommendation to combine any such alternate solutions if they should appear.

Obviousness fails on all counts – unknown original problem; solution not known to journeymen; no recommendation to combine subassemblies; and cannibalized parts won't work in combination claimed.

Four-Way Combinations Under Section 103 Still Fails Without Mask-on-Meniscus and Without Recommendation

Claims 2, 4-5 and 20-21 are subject to a four-reference combination attributed to a person of ordinary skill. These four references are:

Klosner et al. '908	Murayama et al. '552
Moskovitch '861	Konoma et al. '897

Counsel will go first to issues of operability of such a four-way recombination; counsel will defer discussion of the logical odds of selecting appropriate element changes to solve an unknown problem in a non-suggested combination.

The problem with defying the odds of making the stated four-element substitution / recombination is that, even if made, such a four-way substitution / recombination would not do the job. as claimed in this patent application.

This group of claims describes something quite unusual in high-resolution imaging – it arranges, usually by dividing, the projection lens elements to place the mask (or mask pattern) directly on the curved exit surface of the mirror-twin-meniscus lens which provides the required zero optical effect. As described in the original written description, page 16, "...(We) need to project the condensed beam onto a curved surface of an optical system, which on refraction would not deviate the beam. This calls for a zero-power optical system, the outer surface on which the converging illumination beam is in focus... such a device ... has an outer curved surface and would not deviate nor shift the beam laterally on transition... the outer curved surface... carries the curved mask." This has great elegance, in that it places the mask pattern precisely where it will be least subject to aberration, while at the same time providing it with appropriately curved support across the entire curved area. A self-supporting mask will be perfectly placed optically; a flimsy mask will be fully-supported and provided with curvature required for optical advantage, as well as being perfectly placed optically.

The Examiner fully understands the importance of mounting the mask directly on the exit curvature of the zero-power mirror-twin meniscus. Claim 3 is allowed on the condition that it be rewritten independently. The difference between Claim 3 and the other claims in this group is that Claim 3 has the pattern directly applied on the curved exit surface while the other claims use the exit surface to support and supply curvature to the curved mask.

The Examiner is asked to reconsider and withdraw this ground of rejection. There is no recommendation in any of the prior art to use the exit curved surface of a meniscus lens as mask support. Mask support is usually quite simple, especially for flat masks. Such flat masks typically have frames for the support function, and the frames in turn are held in suitable receptacles. Even in the situation of Klosner et al. '908, which shows curved mask and curved substrate, the mask support is shown almost schematically, like a half-grapefruit or half-cantaloupe on a dish.

In this patent application, however, the support for the mask is more sophisticated. The curvature of the mask is made the same as the curvature of the exit meniscus exit surface. The exit meniscus provides both stiffness and positioning to the mask, which may be other than self-supporting or self-positioning. The zero-power twin-meniscus thus is multi-purpose. It does its optical function of compensation. It positions the mask. In one embodiment, it has the pattern directly placed on the curved exit surface. It supports and even provides curvature to a flimsy or flexible mask.

The realities of microelectronics and display production are such that a very expensive and complex imaging system depends on a number of masks of differing patterns to personalize its throughput of patterned substrates. This is analogous to a photographic development system which depends upon a number of exposed and developed negatives to personalize its throughput of photo-images for printing. The individual masks, even if high-resolution, may be almost infinitely inexpensive as contrasted to the cost of the entire system.

The Examiner is asked to withdraw the citation of ex parte Masham, or at least to differentiate it, because this is not a use limitation but a structural limitation. The curved mask needs to be placed exactly on the curved surface and match its curvature, to function according to the claim. The exact words of Claim 2 in this area are:

"...two identical menisci grouped in close proximity, with their concave surfaces facing each other and arranged for zero power so as not to deviate nor shift the beam laterally on transmission, with means for closely holding a patterned mask against the outer surface of the beam exit meniscus ..."

This is much wordier than when the previous version of the claim used the term "zerogon." in the same meaning. This is not new matter; he term "zerogon" is defined in the written description, for example at page 17, lines 4-22.

The Examiner's reference to ex parte Mashan is generally correct in its hornbook observation "... the manner in which a claimed element is intended to be employed does not differentiate ... the claimed structural limitations." Ex parte Mashan, however, should not be applied here, as it should not be applied generally to production tooling. A production tool such as a drill press or punch press must generally be defined in terms of throughput, even though it operates in its own mode.. What part does it act upon? How does the operator change from working on a first production part to a subsequent identical additional production part in the same production run, and how does the operator change to a different production part to start a different production run? A drill press affects a production part by making holes of varying sizes and depths, in patterns as required. A punch press may make a very similar part in a very different way.

The varying amount of human intervention required, depending on the type of production part and the scope of automation or personalization for that particular production part, is typically characterized in terms of "soft tooling" or "hard tooling.". A drill press, with an assigned skilled operator, can do a variety of tasks, is an example of soft tooling.

The Examiner's application of the *ex parte Mashan* rule, accordingly, must be subject to a discussion of human intervention rather than automation. Sometimes, particularly in the case of production systems, even hard tooling may require a personalization device such as a mask. The overall activity is according to the mode of

operation of the system, but the effect on the throughput device (the substrate here) must be personalized by a mask. The production tool needs structure and mode of operation to accommodate a mask for both effective production throughput and easy change of mask. This is not an attempt to patent a *de minimis* change in use of an existing production tool. This is not even the "new use for an old device" which is patentable conditioned on novelty and level of invention. This is novel and useful ***structure***, which has patentable novelty and level of invention in that it gets important extra use from the exit curvature of a zero-power mirror-twin-meniscus lens section, already needed for aberration correction. This is a proper and virtually cost-free support for a curved mask, which mask may be so flimsy as to require full-area support, at the exact position required, the exit surface of the exit meniscus lens. The inventors determined that the provision of a separate curved mask support could be dispensed with, by using the curved exit meniscus surface as a support. Engineers congratulate such dual-use of an element, using the term "elegant."

The point of the structural limitation previously called "zerogon" in written description and claims, and now listed as "...two identical meniscus elements grouped in close proximity, with their concave surfaces facing each other and arranged for zero power so as not to deviate nor shift the beam laterally on transmission, with means for closely holding a patterned mask against the outer surface of the beam exit meniscus ..." The Examiner is asked to reconsider and to withdraw the *ex parte Mashan* reference.

The multiple-use, of exit meniscus lens exit surface of the zero-power twin-meniscus compensating section of the projection lens, is not the same structure used for a different purpose. The meniscus lens element still acts as a lens. This multiple use is characteristic of a novel and different structure which has the elegance of multiple use, in a purpose critical to the invention, with a minimum of multiple hardware.

Odds Against Four-Citation Obviousness

Counsel does not know how to calculate the odds against random choice of features from four complex patents to combine randomly to reach the exact combination claimed in a fifth patent application. Assuming five features in each of the four references, there would be 5*5*5*5=625 combinations not counting omissions. The odds that the exact claimed combination would be selected might be 1 / 2*2*2*2 or 1:16 or some even greater odds. Absent a recommendation as to how to combine and which features to combine, at some point there are too many choices, and very early one encounters the disaster of inoperative combinations from too many choices.

In this situation there is no recommendation as to how to combine, and no stated problem to solve prior to the disclosure of the current patent application. Counsel, being confident of his "inoperability" defense against obviousness rejection, and confident also in his "unsuggested" backup defense against combining features, and confident in his "undefined problem" reserve defense, considers himself lucky that he does not depend on the "overwhelming odds" defense against rejection. Counsel does not contend that four Section 103 citations must present overwhelming odds against obviousness, but does contend that there is some finite (probably single-digit) number of references at which the odds against obviousness become overwhelming.

Allowance of Claims 2, 4-5 and 20-21 is requested.

Response to Paragraphs 15-16 Allowable Subject Matter

Counsel thanks the Examiner for the observation that a certain group of claims (Claims 3, 6-9 and 12) are allowable conditioned on being rewritten to eliminate their being dependent upon a non-allowed parent claim.

Accordingly, Claims 3 has been rewritten independently, and Claims 6-9 and 12 have been rewritten to be dependent on amended (now-allowable) Claim 3 or independently.

Applicants thank the Examiner for the conditional allowance of Claims 3, 6-9 and 12 and for stating the reasons for such conditional allowance.

Conditions having been met, the Examiner is asked to allow Claims 3, 6-9 and 12 as amended.

Response to Paragraph 17 Prior Art Made of Record

Counsel thanks the Examiner for the citation of prior art of record, with the explanation that Ishibai '830 "discloses a pair of identical meniscus lens elements for compensation of spherical aberrations and off axis axial aberrations. This establishes that paired complementary identical meniscus lens elements have been known to have useful characteristics. Applicants did not consider paired complementary identical meniscus lens elements as their invention, but rather considered paired complementary identical meniscus lens elements as a feature in their inventive combination of features.

Response to Paragraph 18 Information

Counsel thanks the Examiner for providing administrative information and communication channels.

Notes Concerning Retention of Drawings and Written Description

The rules permit Applicants to cancel certain portions of the original patent application in situations involving restriction where claims are withdrawn. Applicants make no such cancellation, and request that any such portions of the original patent application be retained, pending the expected filing of one or more divisional applications to secure patent protection for claims withdrawn as being directed to non-elected Inventions.

The withdrawn claims are as follows:

Invention III Claims 14-16, drawn to a curved mask, class 430/5.

Invention IV Claims 17-18, drawn to a projection lithography mask made by contact/non-contact lithography process, class 430/311.

Counsel has not deleted the portions of the written description dealing with the curved mask *per se* and the techniques for making a curved mask, believing it appropriate to leave this written description in place, even after continuing applications might be filed, because this discussion helps the public in understanding how the system operates.

Concluding Summary

Applicants and counsel have made a spirited and careful attempt to resolve all issues, and have discussed each point of the Examiner's Office Action in sequence, referencing paragraphs wherever possible to the same paragraph numbers. used by the Examiner.

The application has been carefully reviewed for errors, including errors of rule following in presentation, errors in science and errors in language as well as ordinary typos. and spelling errors. Claims 3, 6-9 and 12 are conditionally allowed (being dependant on a parent claim made allowable by amendment) and the condition has been met. Allowance of Claims 3, 6-9 and 12 is requested.

Claims 14-18 stand formally withdrawn pursuant to FINAL restriction.

Allowability is requested for Claims 1-2, 4-5, 10-11 and 13-24, the non-allowed claims remaining of those which the Examiner has selected for examination. Certain selected claims, which were previously restricted, are included by the Examiner in the Office Action as a matter of professional courtesy. Counsel heartily thanks the Examiner for this inclusion.

The supporting drawings and written description have been carefully reviewed and corrected. The reasons for allowability have been given by the Examiner (for conditionally allowed claims) and by these Remarks.

Claims 3, 6-9 and 12 have been conditionally allowed and the conditions have been met. Allowance of Claims 1-2, 4-5, 10-11, 13 and 19-24, has been shown in form and in novelty, and is requested. All other claims have been withdrawn.

Formal Notice of Allowance is requested.

Respectfully submitted,

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By Carl C. Kling

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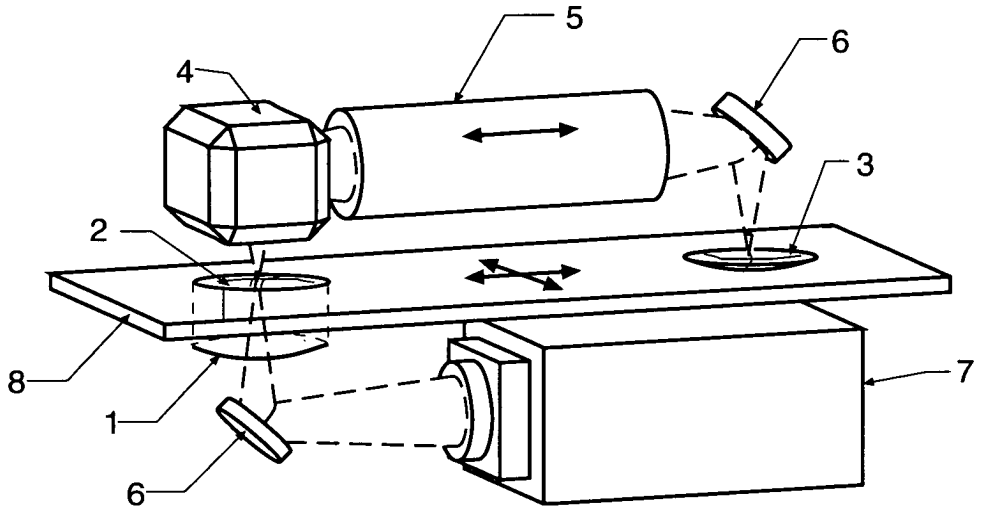

Fig. 1

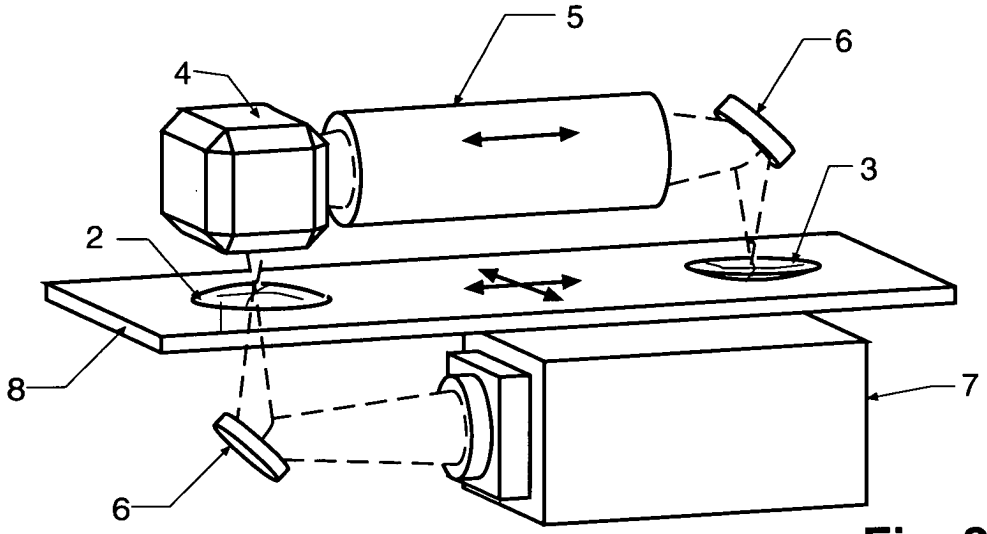

Fig. 2
PRIOR ART

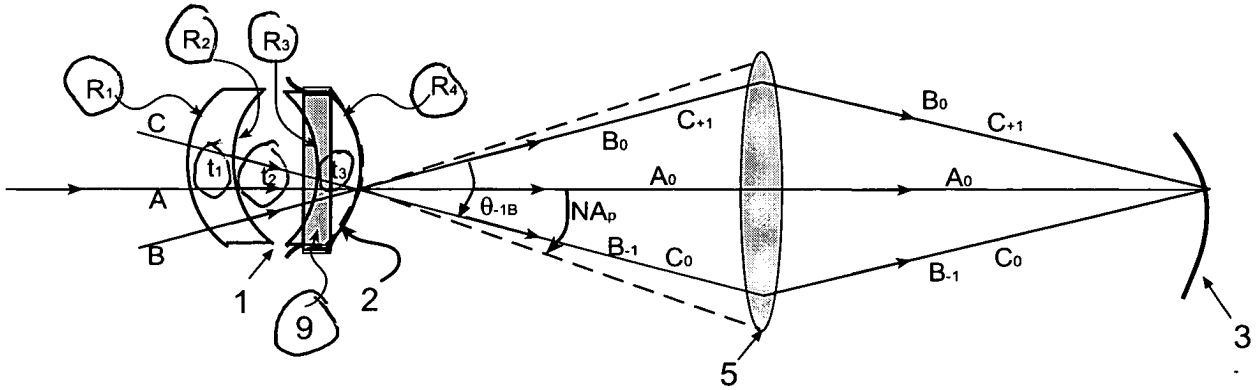

Fig. 9